

REVIEWER'S REPORT

Manuscript No.: IJAR-57303**Title: LA RECHERCHE AGRONOMIQUE AU SENEGAL : ANALYSE CRITIQUE DES PRATIQUES METHODOLOGIQUES ET PISTES D'AMELIORATION****Recommendation:****Accept after minor revision**

Rating	Excel.	Good	Fair	Poor
Originality		✓,		
Techn. Quality		✓,		
Clarity	✓,			
Significance	✓,			

Reviewer Name: Abdul Haseeb Mir**Detailed Reviewer's Report**

The research article titled "La Recherche Agronomique au Sénégal: Analyse Critique des Pratiques Méthodologiques et Pistes d'Amélioration" provides a vital meta-analytical perspective on the state of agricultural science in West Africa. The author establishes that the quality of agronomic research is the fundamental engine for food sovereignty and economic stability in Senegal. By conducting a systematic review of existing studies, the paper identifies a significant gap between the high volume of research output and the methodological rigor required to ensure that these findings are reproducible and scalable. The narrative successfully argues that while Senegalese researchers are prolific, their work is often hampered by a standardized and sometimes uncritical application of statistical models, which can obscure complex biological realities and lead to erroneous conclusions. This study serves as a necessary "methodological audit" that challenges the academic community to move beyond routine data collection toward a more sophisticated, transparent, and model-driven approach to agricultural experimentation.

The narrative begins by framing the central role of statistics in the life sciences, where the author evaluates the "Randomized Complete Block Design" (RCBD) as the dominant experimental architecture in Senegalese agronomy. The study finds that over 52% of the reviewed research utilizes this design, yet the author handles this data with a critical lens, noting that the choice of RCBD is frequently presented as a default rather than a justified decision based on the heterogeneity of the experimental site. A significant strength of this analysis is the exploration of how "design inertia" can limit the discovery of interaction effects. The author suggests that the over-reliance on simple ANOVA models, which the study reveals is used in nearly 43% of cases, often ignores the underlying assumptions of normality and

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homoscedasticity. By highlighting these technical oversights, the narrative effectively demonstrates that the "scientificity" of a paper is often undermined at the very foundation of its experimental design.

A primary focus of the research involves the evaluation of sampling techniques and the determination of sample sizes, which the author identifies as a major "blind spot" in the current literature. The findings reveal that while random sampling is the preferred method in 75% of studies, the actual formulaic justification for the chosen sample size is conspicuously absent in most publications. The author explores the consequences of this omission, arguing that underpowered studies—those with sample sizes too small to detect a true effect—are a waste of resources and can lead to a "false negative" trap. Conversely, the study notes that without a clear understanding of the sampling frame, results cannot be confidently generalized to the broader Senegalese agro-ecological zones. This evaluation of statistical power is handled with significant depth, positioning it as a prerequisite for the credibility of agricultural policy recommendations that stem from these studies.

The discussion then moves to a particularly innovative aspect of the paper: the critique of the "missing link" of crop modeling in Senegalese research. The author evaluates the limited use of simulation tools like DSSAT or APSIM, which are designed to predict yields and assess climate variability impacts. The study suggests that the current research culture is overly focused on "static" field trials that capture a single moment in time, rather than using these trials to calibrate dynamic models that can project future scenarios. The author argues that in the context of rapid climate change in the Sahel, the absence of crop modeling is a strategic weakness. The narrative effectively bridges the gap between traditional field work and modern digital agriculture, suggesting that the integration of these models would allow Senegalese researchers to provide more robust, "climate-smart" solutions to local farmers.

Furthermore, the paper addresses the "transparency crisis" regarding data analysis software and versioning. The author explores how many studies fail to mention the specific software packages or R-libraries used, which hinders the reproducibility of the results. The evaluation suggests that the "black box" approach to data processing—where data goes in and a p-value comes out without a clear audit trail—is an outdated practice that the international scientific community is increasingly rejecting. The narrative concludes that for Senegalese agronomy to achieve its potential, there must be a shift toward "Open Science" principles, where methodology is not just a section in a paper but a transparent, rigorous, and justified process. By advocating for this cultural shift, the author provides a roadmap for elevating Senegalese agricultural research from a local descriptive exercise to a globally competitive scientific endeavor.

In summary, this article offers a robust and intellectually demanding inquiry into the mechanics of scientific production. It successfully bridges the gap between pure statistics and practical agronomy. The

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author's ability to link methodological shortcomings with the broader goal of national food security makes this a significant contribution to the field of agricultural methodology. It is an essential read for research directors, doctoral students, and policy advisors in Senegal and the wider ECOWAS region, providing a clear evidence base for the urgent need to strengthen the training of researchers in advanced biostatistics and environmental modeling.

Recommendations

- The author should consider developing a "Methodological Checklist" based on the findings of this study, which could be adopted by local journals in Senegal to ensure that all submitted manuscripts provide adequate justification for design and sample size.
- To enhance the academic depth of the critique, it is recommended that the author include a section specifically on the "Replication Crisis" in agronomy, comparing the reproducibility rates of Senegalese studies with international benchmarks in the life sciences.
- The paper would benefit from a dedicated discussion on the role of "Interdisciplinary Collaboration," exploring how partnerships between agronomists and professional statisticians could mitigate the widespread "ANOVA default" identified in the study.
- It is suggested that the author include a summary table or flowchart depicting the "Ideal Methodological Workflow," starting from site characterization and hypothesis formulation to the final selection of a statistical model and crop simulation tool.
- Future research should explore the "Barriers to Adoption" for crop modeling software among Senegalese researchers, investigating whether the primary obstacles are related to technical training, computational infrastructure, or a lack of accessible local datasets for model calibration.

Recommendation: Recommend for publication with minor revision.